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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,095	08/26/2005	Michail Tsatsanis	VOY-025US	1121

26875 7590 07/24/2008
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EXAMINER	
CHAN, SAI MING	

ART UNIT	PAPER NUMBER
2616	

MAIL DATE	DELIVERY MODE
07/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,095	TSATSANIS ET AL.	
	Examiner	Art Unit	
	Sai-Ming Chan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-8,10-15,17-22,24-29,31-36 and 38-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-8, 10-15, 17-22, 24-29, 31-36 and 38-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-8, 10-15, 17-22, 24-29, 31-36 and 38-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Erving et al. (U.S. Patent Publication # 20020154716),** in view of **Blanz (U.S. Patent #6907270),** and in view of **Cioffi et al. (U.S. Patent Publication#20020090008).**

Consider **claim 1** Erving et al. clearly disclose and show a method, comprising:

designing a TEQ (Time EQualizer) (paragraph 0058 (design a TEQ)) in a DMT (Discrete Multi-Tone) system (paragraph 0017 (TEQ filter in a DMT-based modem)) to improve throughput performance (paragraph 0058 (improvement in performance and throughput)); and

reducing (paragraph 0058 (design a TEQ with minimal residual ISI)) the number and severity of that the TEQ introduces (paragraph 0058 (residual isi results in noise)) in a transfer function of a shortened main channel (fig. 5, paragraph 0033 (shortening the channel is referred to as TEQ)) in the DMT system.

However, Erving et al. do not specifically disclose eigenvector with a subspace-based method and TEQ coefficient.

In the same field of endeavor, Blanz clearly shows selecting an eigenvector with a subspace-based method (col. 17, lines 62-66 (subspsce is estimated by computing the eigenvectors)), and computing TEQ (col. 2, line 66- col. 3, line 1-5) filter coefficients with the eigenvector (col. 17, lines 62 - col. 18, line 27 (coefficients));

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to demonstrate a TEQ design, as taught by Erving, and show

eigenvector with a subspace-based method and TEQ coefficients, as taught by Blanz, so that the quality of communication is increased.

However, Erving et al., as modified by Blanz, do not specifically disclose reducing the notches.

In the same field of endeavor, Cioffi clearly show notch reduction (paragraph 0114 (notch filtering mechanism)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a TEQ design, as taught by Erving, and demonstrate notch reduction, as taught by Cioffi, so that the DMT network can function efficiently.

Consider **claim 15** Erving et al. clearly disclose and show a system (abstract (algorithm)), comprising:

means for designing a TEQ (Time EQualizer) (paragraph 0058 (design a TEQ)) in a DMT (Discrete Multi-Tone) system (paragraph 0017 (TEQ filter in a DMT-based modem)) to improve throughput performance (paragraph 0058 (improvement in performance and throughput)); and

means for reducing (paragraph 0058 (design a TEQ with minimal residual ISI)) the number and severity of that the TEQ introduces (paragraph 0058 (residual isi results in noise)) in a transfer function of a shortened main channel (fig. 5, paragraph 0033 (shortening the channel is referred to as TEQ)) in the DMT system.

However, Erving et al. do not specifically disclose eigenvector with a subspace-based method and TEQ coefficient.

In the same field of endeavor, Blanz clearly shows means for selecting an eigenvector with a subspace-based method (col. 17, lines 62-66 (subspsce is estimated by computing the eigenvectors)), and means for computing TEQ (col. 2, line 66- col. 3, line 1-5) filter coefficients with the eigenvector (col. 17, lines 62 - col. 18, line 27 (coefficients));

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to demonstrate a TEQ design, as taught by Erving, and show eigenvector with a subspace-based method and TEQ coefficients, as taught by Blanz, so that the quality of communication is increased.

However, Erving et al., as modified by Blanz, do not specifically disclose reducing the notches.

In the same field of endeavor, Cioffi clearly show notch reduction (paragraph 0114 (notch filtering mechanism)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a TEQ design, as taught by Erving, and demonstrate notch reduction, as taught by Cioffi, so that the DMT network can function efficiently.

Consider **claim 29** Erving et al. clearly disclose and show a computer readable medium, having stored thereon computer-readable instructions, which when executed in

a computer system (col. 2, line 48-col 3, line 5 (computer readable instructions), cause the computer system to :

designing a TEQ (Time EQualizer) (paragraph 0058 (design a TEQ)) in a DMT (Discrete Multi-Tone) system (paragraph 0017 (TEQ filter in a DMT-based modem)) to improve throughput performance (paragraph 0058 (improvement in performance and throughput)); and

reducing (paragraph 0058 (design a TEQ with minimal residual ISI)) the number and severity of that the TEQ introduces (paragraph 0058 (residual isi results in noise)) in a transfer function of a shortened main channel (fig. 5, paragraph 0033 (shortening the channel is referred to as TEQ)) in the DMT system.

However, Erving et al. do not specifically disclose eigenvector with a subspace-based method and TEQ coefficient.

In the same field of endeavor, Blanz clearly shows selecting an eigenvector with a subspace-based (col. 17, lines 62-66 (subspace is estimated by computing the eigenvectors)) design computer readable medium (col. 2, line 48-col 3, line 5 (computer readable instructions), and computing TEQ (col. 2, line 66- col. 3, line 1-5) filter coefficients with the eigenvector (col. 17, lines 62 - col. 18, line 27 (coefficients));

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to demonstrate a TEQ design, as taught by Erving, and show eigenvector with a subspace-based method and TEQ coefficient, as taught by Blanz, so that the quality of communication is increased.

However, Erving et al., as modified by Blanz, do not specifically disclose reducing the notches.

In the same field of endeavor, Cioffi clearly show notch reduction (paragraph 0114 (notch filtering mechanism)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to incorporate a TEQ design, as taught by Erving, and demonstrate notch reduction, as taught by Cioffi, so that the DMT network can function efficiently.

Consider **claims 3,** and **as applied to claim 1 above,**

claims 17, and **as applied to claim 15 above,**

claims 31, and **as applied to claim 29 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) method (paragraph 0020 (maximum SSNR)).

Consider **claims 4,** and **as applied to claim 1 above,**

claims 18, and **as applied to claim 15 above,**

claims 32, and **as applied to claim 29 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol Interference) method (paragraph 18 (TEQ to minimize ISI)).

Consider **claims 5,** and **as applied to claim 1 above,**

claims 19, and **as applied to claim 15 above,**

claims 33, and **as applied to claim 29 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue (paragraph 0017 (optimal TEQ with smallest eigenvalue and eigenvector)).

Consider **claims 6,** and **as applied to claim 1 above,**

claims 20, and **as applied to claim 15 above,**

claims 34, and **as applied to claim 29 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein selecting the eigenvector comprises maximizing the achievable bitrate (paragraph 0004 (DMT is used on DSL which provides high speed communication)) over a subspace of eigenvectors.

Consider **claims 7,** and **as applied to claim 1 above,**

claims 21, and **as applied to claim 20 above,**

claims 35, and **as applied to claim 34 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue (paragraph 0059 (repeated iterations resulted in the eigenvector corresponding to the largest eigenvalue)).

Consider **claims 8,** and **as applied to claim 1 above,**

claims 22, and **as applied to claim 15 above,**

claims 36, and **as applied to claim 29 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein the TEQ design is used in a multiline communications system (paragraph 0004 (DMT)) having multiple twisted copper pairs (paragraph 0014 (twisted pair copper wires)) as a single multiline communications channel, and physical-layer signals (paragraph 0015 (pulse(symbol))) coordinated across multiple transmitters and/or across multiple receivers for the purpose of minimizing (paragraph 0017 (minimize ISI)) interference noise from external sources (paragraph 0014 (ISI and ICI)), such as crosstalk noise from other high-bitrate services (paragraph 0002 (DSL and ISI dispersion)) operating in a common binder or adjacent binders.

Consider **claims 10,** and **as applied to claim 8 above,**

claims 24, and **as applied to claim 22 above,**

claims 38, and **as applied to claim 36 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-Noise Ratio) method (paragraph 0020 (maximum SSNR)).

Consider **claims 11,** and **as applied to claim 8 above,**

claims 25, and **as applied to claim 22 above,**

claims 39, and **as applied to claim 36 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol Interference) method (paragraph 18 (TEQ to minimize ISI)).

Consider **claims 12,** and **as applied to claim 8 above,**

claims 26, and **as applied to claim 22 above,**

claims 40, and **as applied to claim 36 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue (paragraph 0017 (optimal TEQ with smallest eigenvalue and eigenvector)).

Consider **claims 13,** and **as applied to claim 8 above,**

claims 27, and **as applied to claim 22 above,**

claims 41, and **as applied to claim 36 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein selecting the eigenvector comprises maximizing the achievable bitrate (paragraph 0004 (DMT is used on DSL which provides high speed communication)) over a subspace of eigenvectors.

Consider **claims 14,** and **as applied to claim 8 above,**

claims 28, and **as applied to claim 22 above,**

Erving et al., as modified by Blanz, clearly disclose and show a method, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue (paragraph 0059 (repeated iterations resulted in the eigenvector corresponding to the largest eigenvalue)).

Claims 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Redferm (U.S. Patent Publication # 20020163983),** and in view of **Reusens et al. (U.S. Patent #6240129).**

Consider **claim 43,** Redferm clearly discloses and shows a method of processing a received DMT symbol that is preceded by a prefix (paragraph 0027 (prefix)) and does not include a suffix (paragraph 0027 (prefix and DMT symbols)), the method comprising: extracting a last portion of a prefix symbol (paragraph 0027 (last W samples)); shaping a prefix with a prefix window (paragraph 0027 (window)) to create a shaped prefix; shaping a DMT symbol that does not include a suffix (paragraph 0027 (prefix and DMT symbols)) with a DMT window (paragraph 0027 (received DMT symbols multiplied by 1-w(n))) to create a shaped DMT symbol; and combining the shaped DMT symbol and the shaped prefix (paragraph 0027 (adding prefix and DMT)).

However, Redfrem does not specifically disclose the combined shaped DMT symbol and shaped prefix generate a full rectangle symbol with a length less than or equal to a boundary prefix length.

In the same field of endeavor, Reusens et al. clearly show the combined shaped DMT symbol and shaped prefix (col. 3, lines 13-16 (add prefix to DMT symbols)) generate a full rectangle symbol (col. 4, lines 48-67 (rectangular)) with a length less than or equal to a boundary prefix length (col. 4, lines 48-67 (rectangular window equals the window body length)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to demonstrate a TEQ design, as taught by Erving, and show the combined shaped DMT symbol and shaped prefix generate a full rectangle symbol with a length less than or equal to a boundary prefix length, as taught by Reusens, so that the DMT network can function efficiently.

Consider **claim 44,** Redferm clearly discloses and shows a method of processing a received DMT symbol that has not been windowed for transmission (paragraph 0034 (without windowing)), the method comprising: extracting a last portion of a prefix symbol (paragraph 0027 (last W samples)); shaping a prefix with a prefix window (paragraph 0027 (window)) to create a shaped prefix; shaping a DMT symbol that has not been windowed for transmission with a DMT window (paragraph 0027 (received DMT symbols multiplied by 1-w(n))) to create a shaped DMT symbol; and combining the shaped DMT symbol and the shaped prefix (paragraph 0027 (adding prefix and DMT)).

However, Redfrem does not specifically disclose the combined shaped DMT symbol and shaped prefix generate a full rectangle symbol with a length less than or equal to a boundary prefix length.

In the same field of endeavor, Reusens et al. clearly show the combined shaped DMT symbol and shaped prefix (col. 3, lines 13-16 (add prefix to DMT symbols)) generate a full rectangle symbol (col. 4, lines 48-67 (rectangular)) with a length less than or equal to a boundary prefix length (col. 4, lines 48-67 (rectangular window equals the window body length)).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to demonstrate a TEQ design, as taught by Erving, and show the combined shaped DMT symbol and shaped prefix generate a full rectangle symbol with

a length less than or equal to a boundary prefix length, as taught by Reusens, so that the DMT network can function efficiently.

Response to Amendment

Applicant's arguments filed on April 28, 2008, with respect to claims 1, 15, 19, 43 and 44 on pages 9-13 of the remarks, have been carefully considered.

In the present application, Applicants basically argue, that Redfrem does not teach or suggest "the combined DMT symbol and prefix generate a full rectangle with a length less than or equal to a boundary prefix length" and Erving fails to disclose "reducing the number and severity of notches that the TEQ introduces in a transfer function shortened main channel ". The Examiner has modified the response with new references which provide "the combined DMT symbol and prefix generate a full rectangle with a length less than or equal to a boundary prefix length" and "reducing the number and severity of notches that the TEQ introduces in a transfer function shortened main channel". See the above rejections of claims 1, 15, 19, 43 and 44, for the relevant interpretation and citations found in Cioffi, Blanz and Reusens, disclosing the limitations.

Conclusion

Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

Commissioner for Patents

P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Sai-Ming Chan whose telephone number is (571) 270-1769. The Examiner can normally be reached on Monday-Thursday from 6:30am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Seema Rao can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 571-272-4100.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

/Sai-Ming Chan/

Examiner, Art Unit 2616

July 10, 2008.

/Seema S. Rao/

Supervisory Patent Examiner, Art Unit 2616